

**CONSTRUCTION SPECIFICATIONS FOR  
WASTE STORAGE FACILITY  
(No.)  
Code 313**

**SCOPE**

This specification shall consist of the clearing, grubbing, excavation, backfill, concrete, forms, reinforcing steel, timber, trusses, sheet metal roofing, fasteners, other appurtenances and services required for the construction of waste storage or waste conveyance structures (i.e., dry stacks, composters, tanks, flumes, etc.) and the disposal of all cleared and excavated materials. Construction shall be carried out in such a manner that erosion, water air, and noise pollution will be minimized and held within legal limits as established by state and federal regulations.

All structures shall be constructed according to plans furnished by the Natural Resources Conservation Service (NRCS) and in accordance with NRCS's engineering standards for these practices, as well as local building codes and current industry standards. Any deviation from the approved drawings and specifications must be approved by the engineer prior to construction.

**CLEARING AND GRUBBING**

All trees, brush, stumps, boulders, rubbish and manure shall be removed from the foundation, storage, and spoil area(s) before excavation is performed. All material cleared from the area shall be disposed of by burning or burying on-site or hauling to an appropriate landfill. All burning shall conform to state and federal laws and regulations. Trees and other cleared vegetation will be cut flush with the ground surface in spoil areas. The foundation and/or storage area will have all stumps, roots and

vegetation removed. The general area around buildings will also require grubbing as necessary to complement the use intended for the structure. The limits of the grubbing will be staked by the engineer or his/her agent.

**EXCAVATION**

Topsoil excavated from the site will be stockpiled for later placement around the completed structure. Soils containing excessive organic material will be removed from the foundation area. The completed excavation and placement of spoil material shall conform as nearly to lines, dimensions, grades, and slopes shown on plans or staked on the ground as skillful operation of the excavating equipment will permit.

Generally, spoil will be placed and spread to blend with the existing terrain of the spoil area. Runoff from outside drainage areas will be diverted away from the excavation area.

Excavated surfaces too steep to be safe and stable if unsupported shall be supported as necessary to safeguard the work and workmen, to prevent sliding or settling of the adjacent ground, and to avoid damaging existing improvements. The width of the excavation shall be increased as necessary to provide space for sheeting, bracing, shoring, and other supporting installations. When the work is completed, such supporting installations shall be removed.

**EARTHFILL**

**Placement.** Earth material placed for pads, flooring, or foundations shall be good sandy

clay or clayey sands and gravels free of detrimental amounts of sod, roots, large stones, and other objectionable material. Highly plastic clay soils should be avoided.

Begin placing and spreading the fill material at the lowest point of the foundation and bring the fill up in approximately horizontal layers not exceeding 9 inches loose thickness. These layers shall be reasonably uniform in thickness and shall extend over the entire area of the fill. Operate the earth hauling or compacting equipment over each layer so that reasonable compaction of the fill material will be obtained.

A minimum of four complete passes over each layer by the compacting equipment is required to obtain adequate compaction.

If a minimum required density is specified, each layer of fill shall be compacted as necessary to obtain that required density.

All finished work shall be left in a neat and sightly condition. The outer edges and slopes of the fill shall blend with the surrounding landscape and complement the structure built upon it.

**Moisture Control.** All fill material shall have a moisture content sufficient for the required compaction. Fill material which is too dry shall be moistened by adding water or by thoroughly mixing with moist fill until an acceptable moisture level is obtained. Fill material which is too wet shall be allowed to dry out naturally or shall be dried by disking or shall be thoroughly mixed with dry fill material until an acceptable moisture level is obtained.

The moisture content of the fill shall be maintained within the limits to:

1. Prevent bulking or dilatence of the material under the action of the hauling or compacting equipment.

2. Prevent adherence of the fill material to the equipment.
3. Ensure the crushing and blending of the soil clods and aggregation into a homogeneous mass.
4. Contain adequate moisture so that a sample can be hand molded without the mold oozing through the fingers or squeezing out any water.

## **TIMBER FABRICATION AND INSTALLATION**

Above ground timber structures, such as litter dry stack facilities, shall be constructed on a firm foundation to the lines and grades shown on the plans. Dimensions and spacings shown on the plans and drawings are minimum requirements for the 25-year wind and snow loads. These dimensions and spacings may be altered if the result is a stronger structure, with prior approval of the engineer. In no case will the dimensions and spacings be modified in a way which would reduce the strength of the structure. All framing shall be true and exact. Timber shall be accurately cut and assembled to a close fit.

Appropriate bracing for safety and structural stability during construction shall be used.

**Wood and Timber.** All material shall be sound wood, free from decay, and of new quality. Good quality, used, pressure-treated lumber may be utilized for walls of composter bins and dry stack storage areas. All timber beams shall be dense, structural quality, and graded in accordance with the Standard Grading Rules for Southern Pine Lumber. Unless otherwise specified, all timber and lumber shall be furnished in American Standard dressed sizes. All sizes specified are nominal sizes.

All structural timber, posts, poles, and lumber, except roof girders, rafters, purlins,

trusses, knee braces, and attic bracing shall be pressure treated. Treated timber and lumber shall be impregnated with the specified type and quantity of preservative and conform to Federal Specification TT-W-571. The minimum net retention of the common preservative, chromated copper arsenate, shall be 0.4 lbs/cf (pcf) for dimension lumber used above ground and 0.6 pcf for structural posts or timbers in contact with the ground. Lumber used for walls of composting bins and dry stack storage areas may be treated to a 0.25 pcf level.

Post and poles shall be set plumb and to the depths shown on the drawings. Backfill around posts/poles shall be concrete as shown on the drawings or shall be hand tamped earth if allowed on the drawings. Post/poles shall be temporarily braced until girders, plates, or other members are installed to maintain plumb alignment.

**Handling and Storing.** All timber and lumber stored at the site of the work shall be neatly stacked on supports at least 12 inches above the ground and protected from the weather by suitable covering. Untreated material shall be so stacked and stripped as to permit free circulation of air between the tiers and courses. Treated timber may be close-stacked. The ground underneath and in the vicinity of all stacks shall be cleared of weeds and rubbish. The use of cant hooks, peavies, or other pointed tools except end hooks, will not be permitted in the handling of structural timber or lumber. Treated timber shall be handled with rope slings or other methods which will prevent the breaking or brushing of outer fibers, or penetration of the surface in any manner.

**Fasteners.** Connections between wood members requiring bolts may be initially done with appropriately sized nails until such time as it is expedient to add the bolts, unless specified otherwise in the drawings.

Bolts shall be added as soon as practicable, before the building is declared structurally sound, and before being accepted as complete. Nails and spikes shall be driven with just sufficient force to set the heads flush with the surface of the wood. Holes for machine bolts shall be bored with a bit of the same diameter as the bolt. Appropriately sized washers shall be used in contact with all bolt heads and nuts that would otherwise be in contact with the wood.

Spiral or annular ring shank nails shall be used in all connections of pressure treated wood. Nails to fasten rafters, girders, cleats, scabs, wooden sidewalls, and/or braces to the pressure treated poles shall be 20d to 40d size or as specified on the drawings. Untreated framing members shall be fastened to each other with 16d to 20d nails.

Examples include roof purlins to rafters, and tie-down cleats or braces to rafters or girders. Various galvanized metal fasteners, with appropriate joist or deck nails, may be used to facilitate assembly, as approved by the engineer. All bolts, washers, nuts, nails, and other hardware exposed to rain or animal wastes shall be galvanized unless otherwise specified.

**Trusses.** Trusses may be metal or wood and shall be designed to handle roof loads specified in the construction details and shall be installed on the spacing compatible with the design. Trusses shall have a minimum of 12 inches of overhang. Trusses may be pre-fabricated, manufactured trusses.

Manufactured trusses will be installed in accordance with the manufacturer's instructions. All trusses will be of a design approved by a registered professional engineer. A copy of the truss certification shall be provided to the NRCS approving authority prior to truss installation.

Truss anchorage and associated supports shall be as shown on the drawings or other

acceptable methods as approved by the engineer.

**Roofing.** Roofing shall be galvanized metal in standard lengths and widths. Roofing material shall be a minimum of 29 gauge and double ribbed. Roofing shall be installed in accordance with manufacturer's recommendations. If any other type of roofing material is desired, it must first be approved by the engineer. Nails used to attach the roofing material to the purlins shall be lead-headed nails, aluminum nails with neoprene washers, or other type as approved by the NRCS approving authority.

## **STEEL REINFORCEMENT**

Reinforcement steel and welded wire fabric shall be new, clean, and free of oil, grease, paints, and flaky rust. Steel bars for concrete reinforcement shall be deformed billet-steel bars, conforming to ASTM Specification A-615, Grade 40 or 60. Welded wire fabric shall conform to the requirements of ASTM Specification A-185.

Reinforcement steel shall be accurately placed as specified and secured in position in a manner which will prevent its displacement during placement of the concrete. If reinforcing steel is spliced, the splices shall provide an overlap equal to 30 times the diameter of the smaller bar in the splice and shall be tied at both ends of the splice. Steel reinforcement in concrete block walls shall be tied in place prior to laying the blocks. Dropping or placing required steel reinforcement into the holes of concrete blocks without properly overlapping and tying the steel together with the foundation steel is not acceptable. Field bending of steel will be permitted. Heating of steel for bending will not be permitted.

Reinforcement steel and welded wire fabric shall be suspended off the ground and other concrete contact surfaces by using scotches

of concrete bricks, concrete blocks or pieces of blocks, wire stands, or other approved method prior to the placing of concrete. Scotches of stones, wood materials, earth, earth clods, clay bricks, scrap metal and other unapproved materials are not acceptable. During concrete placement welded wire reinforcement shall be pulled into the middle of the concrete or the position shown in the drawings. Unless otherwise specified, welded wire fabric shall be spliced in the following manner:

Adjacent sections shall be spliced by overlapping a minimum of one full mesh plus 2 inches, or 6 inches, whichever is greater. The splice length shall be measured from the center of the first transverse wire in one piece of fabric to the center of the first transverse wire in the lapped piece of fabric.

## **CONCRETE**

**Design Mix.** The concrete mixture shall be no less than six bags of cement per yard mix. The water content shall not exceed 6 gallons per bag of cement in the mixture. The concrete shall contain a standard known brand of Portland cement with washed sand and gravel. Clean water shall be used in the mix.

Calcium Chloride and other chemical admixtures for concrete will not be accepted unless expressly specified in the drawings or specifications.

**Consistency.** The amount of water used in the concrete shall be the minimum necessary to obtain the required workability. The consistency of the concrete shall be such that it can be worked readily into the corners and angles of the forms and around reinforcement but without permitting the materials to segregate or excess free water to collect on the surface. The slump shall be between 3-5 inches as tested by "The Test for Slump for Portland Cement Concrete",

ASTM Specification C-143. The air content of the concrete at time of placement shall be between 4 and 7% of the volume of the concrete. Air entraining admixtures shall conform to ASTM Specification C-260.

**Fiber Reinforced Concrete.** Fiber shall consist of 3/4 inch length virgin homopolymer polypropylene fibers, either the collated fibrillated type or the monofilament type. The minimum rate of application is 1.5 lbs. of fiber per cubic yard of concrete.

The addition of fiber to a concrete mix may cause an apparent reduction in slump. However, no additional water shall be added to the mix to improve workability. If needed, a suitable plasticizer should be added to the concrete mix. During placement the fiber mix will generally require more effort and vibration to move the mix and consolidate it into the forms due to the lower slump nature. Properly controlled internal vibration is acceptable, but external vibration of the forms and exposed surfaces is preferable to prevent fiber segregation.

If welded wire fabric is omitted from concrete slabs and only fiber additives are used, contraction joint spacing will be reduced from a maximum of 30 feet to a maximum of 10 feet in any direction.

Sawn joints shall be 1/4 of the slab's thickness in depth. Formed joints shall be the keyway type. Smooth vertical joints through the slab are not permitted.

Fiber additives in concrete do not take the place of structural steel reinforcement. Where steel reinforcement is shown on drawings it shall be placed as shown.

**Forms.** Forms shall be of wood, steel, or other approved material. Forms shall be true to line and grade, mortar tight, and sufficiently rigid to prevent objectionable deformation under load. Form surfaces shall

be smooth, free from irregularities, dents, sags, or holes when used for permanently exposed surfaces. Rods used for internal ties shall be so arranged that, when the forms are removed, metal will not be less than 1 inch from any concrete surface. Forms for walls and vertical sections 2 feet high and taller shall be stabilized with adequate tie rods, walers, cat-heads and sufficient bracing to prevent shifting or movement of forms during placing of concrete.

Forms for exposed surfaces shall be coated with a non-staining form release agent which shall be applied before the concrete is placed. All excess release agent on the form surfaces and any on surfaces requiring bonding with concrete shall be removed.

All form removal shall be accomplished in such a manner as to prevent injury to the concrete. Forms for floor slabs and such work may be removed after a minimum of 24 hours. Forms for walls shall be left in place for a minimum of 3 days. All forms must be removed before final inspection of the work. All repair work must be done immediately after removal of forms.

**Timing and Temperature.** Concrete shall be placed within 1-1/2 hours after introduction of water to the cement and aggregates. Concrete shall not be placed when the outside temperature is expected to fall below 40° F at the time the concrete is delivered and placed at the work site. Concrete shall not be exposed to freezing temperatures during the curing period. Concrete, when deposited in the forms during hot weather, will have a temperature not greater than 90° F at the time of placement. Ice may be used as a portion of the mixing water to control temperature provided all ice is melted in the mixing process. When the outside temperature reaches or exceeds 90° F, the concrete shall be placed within 45 minutes after batching.

**Conveying and Placing.** No concrete shall be placed until the approving official has given approval of the in-place subgrade, forms, reinforcing steel, and any other items involved or affected by the concrete placement.

Concrete shall be conveyed from mixer to forms as rapidly as practicable by methods which will prevent segregation or loss of ingredients. Hoppers and chutes, pipes, or “elephant trunks” may be used. There shall be no vertical drop greater than 5 feet.

Unless otherwise authorized, all concrete shall be placed upon clean, damp surfaces free from frost, ice, standing and running water, and never upon soft mud, dried porous earth, or fill that does not meet specified compaction requirements. Soft mud or other unacceptable foundation material shall be removed and replaced with gravel or other approved material.

Unless gravel is wetted immediately before placing concrete, plastic with 6 mil thickness shall be placed over gravel prior to concrete placement.

Concrete shall be deposited as close as possible to its final position in the forms. Concrete shall be thoroughly consolidated by rodding or mechanically vibrating the concrete in place supplemented by hand-spading and tamping to remove air voids. Vibrating equipment shall be used when pouring walls and other thin sections.

Concrete floor slabs may be placed at one time or may be poured in sections at different times.

When steel reinforcement is specified for the floor slab, formed contraction joints shall be placed at intervals not to exceed 30 feet in any direction unless otherwise specified. When steel is not used, joints shall be as specified under Fiber Reinforced Concrete. The formed edges of each section shall be keyed to lock the edges of adjacent sections

together. The edge forms may be removable metal or wood forms having the required keyed shape or may be thin galvanized metal designed to be left in place. Smooth vertical edged joints will not be allowed.

**Finishing.** Defective concrete, honeycombed areas, voids left by the removal of tie rods, and unacceptable ridges left on concrete surfaces shall be repaired immediately after the removal of forms unless otherwise authorized and directed. Voids left by the removal of tie rods shall be reamed and completely filled with mortar. Defective concrete shall be repaired by cutting out the unsatisfactory material and placing new concrete which shall be secured with keys, dovetails or anchors. Excessive rubbing of formed areas will not be permitted. All unformed surfaces of concrete, exposed in the completed work, shall have a wood float finish without additional mortar.

**Curing.** Concrete shall be prevented from drying for a curing period of at least 7 days after placement. All exposed surfaces of concrete shall be protected from the direct rays of the sun for at least these first 7 days. All concrete shall be cured by keeping continuously moist for the entire curing period, or until curing compound is applied. Moisture shall be maintained by sprinkling, flooding, fog spraying, or by covering with materials kept continuously moist such as canvas, cloth mats, straw, sand, polyethylene, or other approved material. Wood forms (except plywood) left in place during the curing period shall be kept wet. Formed surfaces shall be thoroughly wetted immediately after forms are removed and shall be kept wet until patching and repairs are completed. Water or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged.

If curing compound is used, two coats of it will be applied to all concrete surfaces

except construction joints and surfaces to which other concrete will be bonded. The compound shall be sprayed on the moist concrete surfaces as soon as free water has disappeared, but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. Curing compound shall meet the requirements of ASTM Specification C-309, Type 2, white pigmented.

## **LANDSCAPE AND VEGETATION**

The area adjacent and in the immediate vicinity of the structure shall be shaped to blend with the natural surroundings and to complement the structure and work area around it. Shaping shall be in such a way as to drain or divert all overland and roof runoff safely away from the structure and surrounding work area. All disturbed areas around the structure, including spoil areas, shall be vegetated and/or surfaced with gravel, chert, or some other acceptable covering as permitted by the NRCS approving authority. Spoil areas not used for farm traffic shall be vegetated.

Permanent vegetation will be established to the plant species and by methods prescribed by the approving official. All vegetating of disturbed areas will be done as critical area planting and shall include liming, fertilizing, seedbed preparation, seeding and mulching. Temporary vegetation may be used when conditions or seeding dates are not suitable for the establishment of permanent vegetation. Disturbed areas shall be mulched regardless of seeding dates. If farm animals will have access to the vegetated area, it will be appropriately fenced until vegetation is well established.

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